

Remarks/Arguments

Favorable reconsideration of the present application is respectfully requested.

Claim 1 is directed to an apparatus for sorting used batteries. Claim 1 has been amended to further recite that the pre-sorting station is arranged for separation of the used batteries into a first portion having substantially round and circular shapes and a second portion having substantially prismatic shapes. Basis for this can be found on page 15, line 20 through page 16, line 13. Method Claim 24 has been canceled in favor of new Claim 26, which similarly recites a method for sorting used batteries, but more clearly sets forth the steps of the method.

As already mentioned, Claim 1 is directed to an apparatus for sorting used batteries, and includes a presorting station being arranged for separation of used batteries into a first portion having substantially round and circular shapes and a second portion having substantially prismatic shapes. Claim 1 further recites that the presorting station connects to first and second resorting stations arranged for the manual examination and removal of undesirable batteries and further objects, as well as for the manual sorting of batteries and other objects that land in the resorting stations during operation.

As is described in the paragraph bridging pages 5 and 6 of the specification, the invention is directed to the sorting of used batteries to be recycled. It is based upon an insight of shape/function characteristics unique to batteries: that there is a relationship between the shape of the batteries (round versus prismatic) and the electrochemical systems used within the batteries, which electrochemical systems are important for the sorting of used batteries for

final disposal or recycling. Thus, a pre-sorter which sorts batteries according to shape will also have the general effect of pre-sorting according to electrochemical system.

More specifically, as is described beginning at line 17 of page 1, the raw materials of batteries can be recycled, but only if the batteries are appropriately sorted according to material composition, which is in turn a function of the electrochemical system being relied upon. For example, industrial batteries are generally prismatic shaped zinc-manganese dioxide batteries, or lithium ion batteries. On the other hand, consumer batteries are more often circular and use different electrochemical systems.

In view of this rough correlation, in accordance with the present invention there is provided a pre-sorting based upon shape — circular versus prismatic.

Since the group of consumer batteries...generally consists of round or circular cylindrical shapes in the electrochemical systems of Leclanche and Alkaline, and the group of industrial batteries generally has square, rectangular or other shapes which are not round or circular cylindrical, the pre-sorting station not only provides a first sorting between consumer batteries and industrial batteries, but also a sorting according to the electrochemical systems (Page 16, lines 14-22).

Since this bulk pre-sorting by shaped will simultaneously have a tendency to separate the batteries in accordance with their electrochemical systems, a subsequent manual resorting can be done more quickly and reliably since it will be limited to identification and removable of batteries which are inconsistent with the shape/electrochemical system correlation of the pre-sorting process (page 6, lines 9-22). Thus, amongst the prismatic pre-sorted fraction it will only be necessary to remove non-battery waste and those batteries which, while prismatic, are not characteristic of the electrochemical systems typical of prismatic batteries. Similarly, amongst the circular fraction, it is only necessary to manually remove non-battery

waste and those circular batteries whose electrical systems are not consistent with the remaining circular batteries.

For example, referring to the nonlimiting embodiment of the figures, the pre-sorting station can comprise a sloping conveyor belt 2, so that round batteries will roll toward the lower end 8 and be received by the sub-outlet station 4, whereas prismatic batteries 18 will be carried to the upper end 7 and land in the sub-outlet 5. A separation between batteries and other objects having round or circular cylindrical shapes and batteries or other objects having prismatic shapes is thus effected by the rolling/non-rolling induced by the sloping conveyor belt 2.

Claims 1-8, 10-19, 24 and 25 were rejected under 35 U.S.C. §103 as being obvious over the U.S. patent to Fuchs et al. The Examiner there alleged that Fuchs et al discloses a pre-sorting station at 17, as well as first and second resorting stations. The Examiner there recognized that one of the "resorting stations" of Fuchs et al does not provide for manual resorting, but alleges that this would have been obvious. This rejection, however, is respectfully traversed, particularly in view of the amended claims.

Fuchs et al is not directed to the sorting of valuable waste components having different characteristics, but is instead directed to the separation of valuable components from valueless waste in mixed rubble, whereby recyclable components are separated from those which are not recyclable (column 1, lines 25-28). According to Fuchs et al, a presorting is achieved through the use of an ascending conveyor. By means of the slope of the conveyor 17, presumably recyclable "heavy, three-dimensional material" slides downward to form a fraction 48, while flat waste items are carried upward to form a fraction 47 (column 5, lines

47-59). The fraction 48, composed of the presumably valuable heavier three-dimensional material, is then conveyed to a sorting area 18 for further manual sorting. Needless to say, the valueless remaining waste of fraction 47 is not further sorted. Fuchs et al thus provides separation based on weight, not simply by circular versus prismatic shape -- both circular and heavy prismatic objects will form the fraction 48.

With reference to Claim 1, this claim now recites that the pre-sorting station is arranged for separating batteries based upon shape — round or circular versus prismatic. Applicants respectfully submit that this represents a structural difference as compared to the “pre-sorter” 17 of Fuchs et al because the “pre-sorter” 17 of Fuchs et al is inherently incapable of separation of batteries based on their shape.

A pre-sorter arranged for providing separation between circular and prismatic shapes, as set forth in Claim 1, is inherently incapable of providing the separation set forth for the conveyor 17 of Fuchs et al, and vice versa. The conveyor belt according to the present invention is arranged at an angle of inclination α . While the angle of inclination can vary, it must be sufficient to induce a rolling action of the circular batteries toward the sub-outlet station 4. However, it must also not be so great as to cause the prismatic batteries to *slide* towards the sub-outlet station 4. Otherwise there would be no separation based upon the circular/prismatic difference in shape.

Conversely, in accordance with Fuchs et al the separation is based upon weight. Three-dimensional material, which is heavy, *slides* (column 5, lines 51-52) downward onto the lower conveyor belt 45. Therefore, the angle of inclination of the conveyor 17 must be sufficient to cause the sliding of heavier denser objects. Separation is therefore not based

upon a circular/prismatic shape dichotomy, using rolling versus non-rolling, but is based upon sliding versus non-sliding in view of density differences.

As already mentioned, Claim 1 recites a pre-sorting station arranged for separating used batteries into first and second portions which respectively have substantially round or substantially prismatic shapes. The conveyor 17 of Fuchs et al is not such a pre-sorting station. If one were to introduce batteries of different shapes as part of the waste material onto the conveyor 17 of Fuchs et al, the (dense) batteries would *all* either roll or slide downward onto the conveyor belt 45, whereas the lighter weight waste material would continue toward the discharge fraction 47. Thus the conveyor 17 of Fuchs et al would not separate used batteries into first and second portions which respectively have substantially round or substantially prismatic shapes, but would separate all of the batteries from non-battery waste.

Moreover, those skilled in the art would have had no motivation to have modified the inclination angle of the conveyor 17 of Fuchs et al to provide separation based on rolling versus non-rolling rather than sliding versus non-sliding, so that only the round batteries roll toward the outlet conveyor 45 whereas the prismatic batteries are carried upward to the outlet fraction 47, since this would undesirably carry part of the valuable recyclable batteries upward to the outlet for the waste fraction 47, rather than separating recyclable versus non-recyclable materials which is the object in Fuchs et al.

For this reason alone, amended Claim 1 clearly defines over Fuchs et al. Fuchs et al does not disclose a pre-sorting station arranged for separating batteries based upon their rolling versus non-rolling shape, and it would not have been obvious for those skilled in the

art to have modified the inclination angle in the conveyor 17 of Fuchs et al to have done so since this would have undesirably defeated its purpose of recyclable/non-recyclable material separation. Beyond this, Claim 1 recites that the *two* resorting stations are arranged for manual examination and removal of undesirable batteries and further objects, as well as for the manual sorting of batteries and other objects that land in the re-sorting stations during operation.

The Examiner recognizes that resorting is only carried out at 18 in Fuchs et al but alleges that resorting of both fractions would have been obvious for those skilled in the art so as to separate the batteries from similarly shaped non-battery waste. However, this alleged motivation is clearly misplaced since, if batteries were included in the waste material to be sorted in Fuchs et al, the pre-sorter 17 of Fuchs et al would deposit all of the batteries in the recyclable material fraction 48. None would be present in the waste fraction 47. Therefore, not only does Fuchs et al lack “two re-sorting stations...arranged for...manual examination”, but there would have been no motivation for those skilled in the art to have provided manual examination for *both* “resorting stations” in Fuchs et al. Claim 1 and its dependent claims therefore clearly define over this reference.

Concerning new Claim 26, which replaces Claim 24, this claim clearly defines over the prior art for the same reason as Claim 1. Claim 26 recites pre-sorting used batteries at a pre-sorting station “providing a first portion having substantially round and circular shapes and a second portion having substantially prismatic shapes.” As previously discussed, the conveyor 17 of Fuchs et al is inherently incapable of providing separation based upon circular versus prismatic shape. Moreover, Claim 26 recites “examining said first and second

portions at said first and second re-sorting stations” and “manually removing undesirable batteries and further objects not belonging to said first and second portions of used batteries” as well as “manually resorting said used batteries of said first and second portions in several sub-portions, and providing said sub-portions of sorted batteries at an outlet station.” As already discussed, only the valuable recyclable fraction discharged from the conveyor 17 of Fuchs et al is subsequently manually resorted, and Fuchs et al would provide those skilled in the art with no motivation to have manually sorted the waste fraction.

Concerning paragraph 5, the dependent Claim 9 was rejected under 35 U.S.C. §103 as being obvious over Fuchs et al in view of the U.S. patent to Roman, which was cited for the feature of Claim 9 of a re-screening separator. However, regardless of what teaching Roman may have in this respect, it provides no teaching for overcoming the shortcomings of Fuchs et al with respect to Claim 1, and so all of the claims are believed to define over these references.

Concerning paragraph 6, the dependent Claims 20-23 were rejected under 35 U.S.C. §103 as being obvious over Fuchs et al in view of the Soviet publication '387. However, here again the secondary reference was cited to teach features specific to the dependent claims, and provides no teaching for overcoming the shortcomings of Fuchs et al with respect to Claim 1.

In view of the cancellation of Claim 24 in favor of new Claim 26 which recites specific steps for the claimed method, the rejection under 35 U.S.C. §112 is believed to be moot.

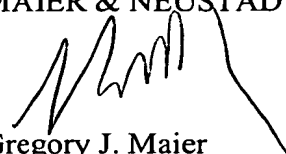
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The Abstract of the disclosure has been revised as required.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early notice of allowability.

Respectfully requested,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Registration No. 25,599
Robert T. Pous
Registration No. 29,099
Attorneys of Record



22850

(703) 413-3000
Fax #: (703) 413-2220
GJM:RTP:tdm
I:\atty\RTP\212300\212300 Amendmet1.wpd